MALEPHORA CROCEA (AIZOACEAE) NATURALIZED IN CALIFORNIA

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Abstract

Malephora crocea, native to Cape Province, South Africa, has been naturalized in southern California at least since 1946, but is not mentioned in California floras. Misidentified specimens have served as the basis for incorrect reports of other species. We document the historical occurrence and current range of *M. crocea* in California and provide a morphological description, illustration, and comparison with other ice plants.

Identification of naturalized plants often is difficult and collections are frequently misidentified. The mesembryanthemums or ice plants (Aizoaceae, sensu Melchior, 1964) are particularly difficult because of the size and complexity of the group and lack of keys to many species. The problem was amplified by the division of *Mesembryanthemum sensu lato* (=Mesembryanthemaceae, Herre and Volk in Schwantes, 1947; Schwantes, 1971) into many genera. Herre (1971) distinguished 125 genera and estimated 2400 species, mostly of xeric habitats in South Africa. Hundreds of species have been cultivated in California; by 1930, Hoffman and coworkers had listed 86 for Santa Barbara. At least 22 have been used as groundcovers in California (Kimnach, 1966). Several persist after cultivation or are naturalized to some degree. Moran (1950) and Munz (1974) considered *Carpobrotus aequilaterus* (Haw.) N. E. Br. [=*Carpobrotus chilensis* (Mol.) N. E. Br.] to be native. Munz listed nine species as naturalized in southern California. This figure is misleading because of misidentifications.

Malephora crocea (Jacq.) Schwant. (Fig. 1) is native to Cape Province, South Africa (Jacobsen, 1960, 1977). It is commonly planted in California in gardens and on streetsides and highway embankments. It is used for erosion control on moderate slopes and is drought tolerant (Anonymous, 1979). Some 15 herbarium specimens show it to be cultivated from Marin and Fresno Counties, California, to Baja California Norte, including Cedros Island, Mexico. A specimen from the James West nursery, San Rafael (*West s.n.,* CAS) shows it was in California by 1933. According to Poindexter (1934), a purple-flowered color form was introduced at about the same time by Kate Sessions, a San Diego

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nurserywoman. Also, a specimen was collected in 1938 from E. O. Orpet's Santa Barbara nursery (*Hartwell s.n.*, SBM). *Malephora crocea* was not listed for the Santa Barbara region previously (Hoffman et al., 1930). Orpet later supplied material for freeway plantings to the State of California Division of Highways (Anonymous, 1954).

Malephora crocea is naturalized in western North America mostly along the coast from northern Santa Barbara County to Baja California Norte, Mexico. Some 26 herbarium specimens show it established at Surf, UCSB Campus, Goleta Slough, Santa Barbara, and Carpinteria Salt Marsh, Santa Barbara County; Ventura, Ojai, Pt. Mugu, and East Anacapa Island, Ventura County; Newport Backbay, Dana Point, and Doheny Beach State Park, Orange County; Riverside, Riverside County; and La Mision, Baja California Norte. It occurs as a garden escape in the vicinity of dwellings and along roadsides and has become established on sea bluffs, stream banks, floodplains, coastal sage scrub habitats, and margins of estuaries. Near estuaries *M. crocea* is especially well-established and grows in several situations. It occurs in open sand and silt of disturbed areas above storm tide, usually with *Atriplex patula* L. subsp. *hastata* (L.) Hall & Clem., *A. semibaccata* R. Br., *Carpobrotus edulis* (Haw.) Schwant., *Frankenia grandifolia* Cham. & Schlecht., *Parapholis incurva* (L.) C. E. Hubbs, *Salicornia subterminalis* Parish, *Spergularia marina* (L.) Griseb., and *Suaeda californica* Wats. var. *taxifolia* (Standl.) Munz. It is locally abundant on shell middens exposed in salt marshes at Newport. This is the only habitat where we have observed numerous seedlings. It also occurs in debris at mean high and storm high tide lines where it establishes apparently from stems deposited there. Under these conditions it often grows with *Cakile maritima* Scop., *Carpobrotus edulis, Osteospermum fruticosum* (L.) Norl., and other naturalized and native plants dispersed by tides.

Although herbarium specimens show *M. crocea* naturalized at least since 1946, California floras omit it (Munz, 1959, 1968, 1974; Smith, 1976). Most specimens in California herbaria have been misidentified, particularly as *Disphyma crassifolium* (L.) Bol. and *Drosanthemum speciosum* (Haw.) Schwant. Apparently it was from such misidentified specimens that Munz (1959, 1974) reported these two species in southern California. The same plants were included in Shetler and Skog (1978) based on Munz's report and in Kartesz and Kartesz (1980). Although *D. speciosum* is cultivated in California, we have seen no evidence that it is naturalized. Howell et al. (1958) report that *Disphyma crassifolium* occurs in San Francisco. We have seen *Howell 32930* (CAS) from above Point Lobos, San Francisco, and *Walther s.n.* (CAS), which lacks locality data. All other specimens labeled *D. crassifolium* are *M. crocea*.

Other ice plants also have been confused with *M. crocea*. For example, some herbarium sheets of it have been labeled *Carpobrotus*

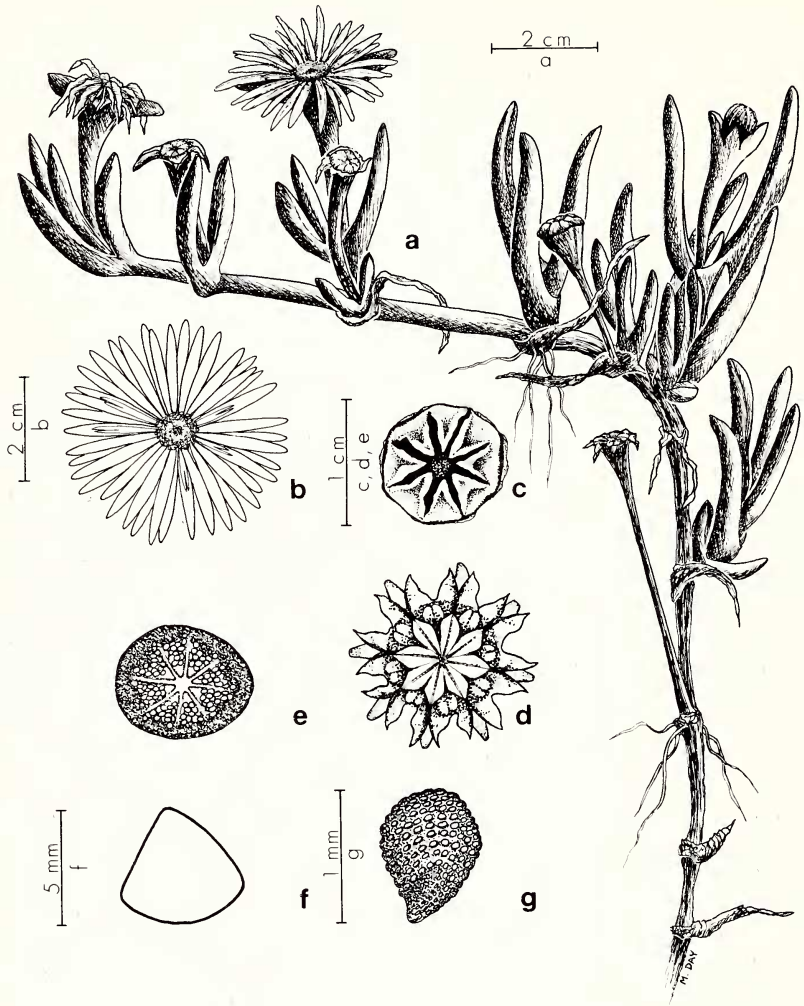

FIG. 1. *Malephora crocea*. a. Habit, showing old and new stem and rooting at nodes. b. Flower, with petals and staminodia. c. Capsule, closed. d. Capsule, open, showing valve wings, seed pockets, and bifid placental tubercles. e. Ovary, cross section. f. Leaf, cross section. g. Seed, showing rows of tubercles.

aequilaterus. This error probably resulted from use of a key to species of *Mesembryanthemum* in Munz (1959) and to genera of the Aizoaceae in Munz (1974). Misidentified specimens of *M. crocea* also occur on a herbarium sheet with a pink form of *Carpobrotus edulis* (a possible hybrid) that is commonly cultivated and naturalized here. *Lampranthus coccineus* (Haw.) N. E. Br. is listed by Munz (1974) as naturalized in coastal environments in southern California. We have not lo-

TABLE 1. CHARACTERISTICS THAT DISTINGUISH *Malephora crocea* FROM FOUR OTHER ICE PLANTS. Species are designated by initials: *C. a.* = *Carpobrotus aequilaterus*; *D. c.* = *Disphyma crassifolium*; *D. s.* = *Drosanthemum speciosum*; *L. c.* = *Lampranthus coccineus*.

		M. c.	*C. a.*	*D. c.*	*D. s.*	*L. c.*
Habit		prostrate, spreading	prostrate, spreading	prostrate, spreading	erect, shrubby	prostrate, spreading
Flower	sepals	4–6, unequal	5, unequal	5, unequal	5–6, unequal	5, equal
	color	orange and/or purple	magenta	pink to magenta	bright orange-red	red
Fruit	type	capsule	berry-like	capsule	capsule	capsule
	locules	8–9 (10)	8–10	5	4–6	5 (4–7)
Seed surface		rough with rows of tubercles	smooth	nearly smooth	rough with ribs and tubercles	rough
Leaf	surface	smooth	smooth	smooth	papillate	smooth
	color	glaucous-blue	green to glaucous-green	dark green	green	green
	cross section	bluntly trigonous	sharply trigonous	bluntly trigonous	terete	narrowly trigonous

cated any naturalized *L. coccineus* nor have we seen any specimens of *M. crocea* bearing that name. However, some specimens of *M. crocea* collected from plants cultivated in California were misidentified as *Lampranthus spectabilis* (Haw.) N. E. Br., a species commonly cultivated but not known to be naturalized in western North America.

Because of the confusion of *Malephora crocea* with other ice plants, we include a description and illustration (Fig. 1), and provide a comparison (Table 1) with other species.

MALEPHORA CROCEA (Jacq.) Schwant., Möller's Deutsch. Gärtn.-Zeitung 43:7. 1928.—*Mesembryanthemum croceum* Jacq., Fragm. Bot. 17. 1800.—*Mesembryanthemum insititum* Willd., Enum. Hort. Berol. 536. 1809.—*Hymenocyclus croceus* (Jacq.) Schwant., Möller's Deutsch. Gärtn.-Zeitung 42:27. 1927.—*Crocanthus croceus* (Jacq.) L. Bol., Fl. Pl. S. Africa 7:255. 1927.

Decumbent or prostrate shrub with pale, corky branches, occasionally rooting at the nodes, forming dense mats to 3 dm high, with stout, gnarled, woody stems in maturity; leaves crowded on short shoots, opposite, connate at base, erect, 2.5–6 cm long, 5–8 mm wide, bluntly trigonous, succulent, smooth, pale bluish-green and glaucous, occasionally reddish; flowers solitary, terminal or axillary, ebracteate, on pedicels 1–6 cm long; calyx 0.8–1.5 cm wide, the lobes 4–6, unequal, at least 2 short, acuminate, with hyaline margins; petals and staminodia usually orange adaxially and purple abaxially; stamens numerous; stigmas 8–9 (–10), plumose; ovaries obcuneiform; placentation parietal; capsule 8–9 (–10) locular, with cell lids, valve wings, adaxial seed pockets with bifid placental tubercles; seeds numerous, lenticular, 1 mm long, 0.8 mm wide, with tubercles arranged in rows (Fig. 1).

Two varieties of *M. crocea* have been designated: var. *crocea* with petals orange adaxially and purple abaxially, and var. *purpureocrocea* (Haw.) Jacobs. and Schwant. with petals purple on both surfaces. Because there is considerable color variation among the populations examined in California, we do not distinguish color forms.

Confusion over the identity of ice plants, as discovered during the investigation of *M. crocea,* suggests that additional taxonomic and nomenclatural problems may exist for other members of the Aizoaceae reported to be naturalized in California. We are continuing to survey the group to contribute to the correct identification of these plants. Because much of the classification of ice plants is based upon fruit characteristics, it would be helpful if collectors prepared herbarium specimens with mature fruits in addition to ample vegetative material, and flowers.

LIST OF SPECIMENS

More than 500 herbarium specimens were examined during this study. Approximately 40 specimens of *M. crocea* have been located

among these and with field observations serve as the basis for this paper. A list of the latter specimens has been distributed to herbaria cited below. Additional copies are available on request from the authors.

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